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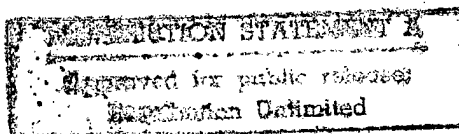
14 March 1983

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# China Report

SCIENCE AND TECHNOLOGY

No. 191



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14 March 1983

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No. 191

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## APPLIED SCIENCES

### VIEWS ON DEVELOPMENT OF COMPUTERS IN CHINA

Beijing ZIRAN BIANZHENGFA TONGXUN [JOURNAL OF DIALECTICS OF NATURE] in Chinese No 6, 1982 pp 3-5

[Article by Wang Xinggang [3769 5887 0474], Computing Technology Institute of the Chinese Academy of Sciences: "Ideas on Developing Computers in Our Country"]

#### [Text] 1. Stress Development of Computer Applications

In the 1950's, we began to develop computers through copying; since then, there has always been the tendency to emphasize hardware over software, mainframes over peripherals and components, research and design over technology and production, applicative experiments over practical results. Thus, for a long time, computers produced in our country have been known to be unreliable, unsupported, not easy to use, and not easy to repair. Moreover, we have too many varieties of computers which are largely identical with only a few minor differences. In addition, our computers are not produced in batches, and development is rather slow. As facts have proven, this is not a good strategy for developing computers.

To thoroughly change this kind of situation, it is necessary to carry out radical reforms. Computer research and development should be aimed at application and not at developing computers for the sake of developing computers. The crux of the matter lies in the lack of real in-depth understanding.

At present, and for some time into the future, the first thing to do is to organize a force (which should include social science workers) to investigate and study ways and strategies for developing computer applications in China; their studies should include priority application areas, economic results, market forecasts, social impact, etc. Only when we have gained a clear idea of the national conditions and what the actual overall needs are for the "Four Modernizations," will we be able to develop computers steadily and continuously.

Computer application is in itself a branch of study. It is not easier to improve the level of computer applications than the level of computer manufacturing. But, the improvement of the level of computer applications is more dependent on industrial level, such as material and technology; it also requires

less investment as well. In view of the current conditions in our country, by stressing the development of computer applications, it will be possible to maximize strong points and minimize weak points, produce practical results relatively fast, and really help to promote the growth of computer manufacturing industry.

The very fact that hundreds of large and medium frame computers and nearly 10,000 microcomputers imported into this country are currently underutilized goes to show that there is an urgent need to improve the level of computer applications. Actually, in light of the current status of China's economic growth, science and technology, and management level, the main problem now does not lie in the lack of large-batch production of computers but rather the failure to utilize small batches of computers. There is a shortage of software people; application research is conducted only by individual organizations or users; and there are very few organizations which offer computer application services. All this goes to show that if we do not shift our strategy, and if computer applications are not emphasized in the readjustment of our industrial structure, it will be impossible to make significant changes in current conditions.

On examining the overall situation, one will find that there are two major realms in the computer industry centered around applications, i.e., computer manufacturing industry and computer service industry (also known as information processing industry). In 1979, the ratio between these two realms in the United States was 2.7:1, while China had no computer service industry at all. This kind of deficiency in industrial structure has greatly hampered the extensive growth of computer applications, and should be remedied.

Thus, on the one hand, efforts should be made to establish new computing service companies which offer a wide range of services, such as renting and servicing computer equipment, consulting, as well as providing contractual software development, stand-alone system computing time and network system computing time, data base information, etc. On the other hand, if it were possible to change the administrative system and management mode of some (not all) computing centers and computing stations owned by certain sectors [of the economy] and have them serve the society at large, they could quickly become the supporting pillars of China's computer service industry. Moreover, such an undertaking does not require much investment, and can bring tremendous gains.

To facilitate the development of computer applications, it is necessary to adopt economic measures to turn software into a commodity, thus allowing software to be developed by the society and serve the society, and completely changing the situation where application programs are only developed by individual organizations and users. This will reduce redundant work and increase the society's wealth of smart products.

Our country's planned economy model is similar to many developing nations; it is possible for application software products which are suitable for planned economic management models to be popularized among a large number of developing nations. It will be a potential international market which is looked down upon by Western developed nations. Our country has both the need and

potentiality for developing this kind of software. Moreover, it is quite possible to open up software markets in developing countries, which will help developing nations to extricate themselves from transnational company exploitation.

In the long run, if we can fully exploit the great wealth of human resources and the relatively low wage rates in this country, it is entirely possible to train a contingent of industrious and intelligent software people who will become a new force in the international software business.

## 2. Emphasize "Micro, Mini, Special-Purpose and Distributed Computer Systems"

The history of the development of computers in the world has brought to light the following law: Due to the enormous amount of expenses involved in computer manufacturing industry, the governments of many countries are doing their utmost to foster their own top-notch computer industry, such as International Computers Limited (ICL) and Siemens. The investment capacity of China's computer enterprise is way behind England, France and West Germany; but, the forest of mountain tops grows in number and does not decrease at all. If this kind of situation is not changed, it will be very difficult for our country's computer industry to grow rapidly. Focusing our national strength on a small number of backbone enterprise and gradually develop specialized branches of industries as well as integrated complexes is the only way to develop batch production capacity, improve quality in the course of mass-quantity production, and cut down costs. We shall never allow ourselves to remain in handwork level!

In view of the funding strength and management level of industries in this country, at present, the way to popularize computer application in China is by focusing mainly on micro and minicomputers which are cheaper, reliable and easy to use, and stress the development of special-purpose computers and distributed computer systems to meet application needs of higher requirements. This will give us a high starting point in our technical level (particularly if microcomputers are used as starting point) conforming to the development trend of moving from centralized to distributed computer application systems, and fairly good performance-cost ratios (these are common features among special purpose machines, which would provide a rather ingenious way of winning victory), as well as fairly good adaptability, reliability and expandability. Moreover, microcomputer software has not been fully developed and enjoys great marketing potentialities. Due to its weak foundations of the past and few burdens, our country is in a position to maneuver freely and catch up in the development and application of "micro, mini, special-purpose and distributed systems," and develop its own unique features.

The further development of large-scale integrated circuits and super-large scale integrated circuits is bound to continuously force down component prices in the international market. As the domestic needs for computers is not very high at the moment in our country, it is worthwhile to either purchase components from other countries and assemble our own micro, mini and special-purpose computers, or purchase foreign-made micros and minicomputers and assemble our own computer complex systems and local networks. At present, most

of the computer hardware expenses are spent on peripherals; a printer is twice as expensive as all the components of a microcomputer, and floppy diskettes and disk drives are even more expensive. The price of a central processing unit chip is less than 5 percent of all the components in a microcomputer. Evidently, when developing microcomputers and minicomputers, the research and development of peripherals should be emphasized, and it is necessary to organize forces to tackle with the problems. It is not only profitable to import some components and assemble systems now, it will also be worthwhile to continue along the same lines for sometime in the future. In fact, those ideas which are centered around central processors have long been outdated!

General-use computers account for the largest proportion of value in the world computer industry. While stressing the development of micro and minicomputers in this country, we should not neglect the development of large and medium frame general-purpose machines, as well as a small quantity of super large and giant computers. While developing general-use and special-purpose computers, emphasis should be placed on application as well as continuity and software compatibility.

It is difficult to solve the problem of compatibility with foreign computers. Thus, one good way of producing compatible computers is by entering into joint ventures with foreign countries.

### 3. Enhance Control, Enliven Academic Group Consulting Activities

Enhance control over imported computers, protect national industries, and do not spend a single penny on anything that is not really needed. Imported items should not only be subjected to technical review prior to importation, but also to annual inspection following exportation to check on actual results. Economic control regulations should be formulated to enforce supervisory control over imported items, and implement reward and penalty system. This is the only way to stop unchecked importation, and attain economic results.

The system of examination and approval should be strictly carried out in funding domestic research and development, and production projects. When starting a project, it is not only necessary to examine the feasibility aspect from the technical point of view, but also feasibility in terms of such conditions as technical force. The results of evaluation should be based on practical application. The entire project should be covered by contract, and rewards and penalties should be carried out (such as deduct salaries of concerned persons!). Such practices as scrambling for projects which one cannot complete at all should be prevented as it is a waste of money and manpower, and detrimental to work.

Our country has already formed a contingent of computer researchers and designers; they should be encouraged to study assiduously, and give free rein to the spirit of blazing new trails. We should never underestimate our own strength as it is entirely possible that our country's scientific and technical people will come up with outstanding achievements in "micro, mini, special-purpose and distributed systems," as well as Chinese character information processing, computer software, and computer science research.



One effective measure of catching up is through international cooperation. Mutually conducive international cooperation should not be neglected; they should be established in a flexible manner in such areas as computer manufacturing, components, peripherals, as well as software industry and personnel training. It is not easy to learn how to do business; it is easy to get the short end of the stick, and consequently the country suffers losses. There is need to enhance the consulting activities among academic groups such as the computer science groups of the academic departments of the Academy of Sciences, and the Computer Society so as to enable them to contribute suggestions and advice to the four modernizations program. In order to play a greater role in helping to strengthen leadership and technical management at all levels, the consultant groups and teams should handle business honestly and impartially.

9119

CSO: 4008/44

## APPLIED SCIENCES

### VERSATILITY OF CHINESE-PRODUCED 'Y-8' MEDIUM TRANSPORT DESCRIBED

Beijing GUOJI HANGKONG [INTERNATIONAL AVIATION] in Chinese No 12, Dec 82  
pp 6-7, and back cover

[Article by Li Yousheng [2621 0645 3932], Zhao Qingyu [6392 1987 3768]]

[Text] The Y-8 medium transport is designed to meet China's transportation needs. After design certification, the aircraft is now in small-scale production.

The Y-8 is a multipurpose, highly versatile aircraft which can be used for both military and civilian transportation. Its basic model is a typical military transport capable of performing tactical missions such as transporting troops and wounded personnel, delivering paratroopers, and air-dropping vehicles and supplies.

The Y-8 powered by four Chinese-made WJ-6 turboprop engines, each with a maximum of 4,250 equivalent horsepower. With one engine out of service, the aircraft can still take off; with two engines out of service in flight (below 5,000 m), the aircraft can still land safely. The aircraft can take off and land not only on conventional concrete runways, but also on dirt strips, grass, snow, or gravel.

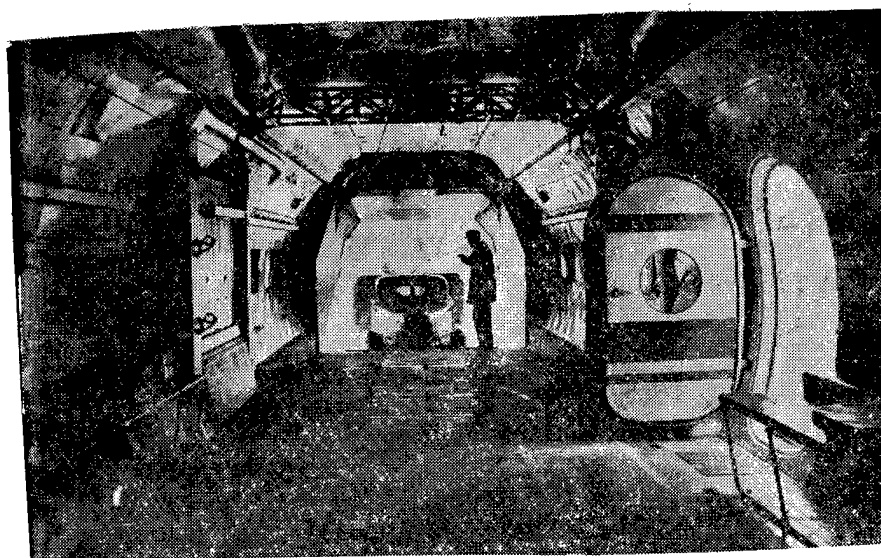
The key technical data of the Y-8 are as follows:

length	34.02 m
height	11.16 m
wing span	38.0 m
wing area	121.86 m <sup>2</sup>
diameter of fuselage cylindrical section	4.1 m
dimensions of cargo bay--length	13.5 m
width	3.0-3.5 m
height	2.4-2.6 m
dimensions of cargo door--length	7.67 m
width	2.16-3.10 m
maximum take-off weight	61 tons
empty weight	35.5 tons
maximum landing weight	58 tons
maximum fuel capacity	22.066 tons

[continued]

maximum payload	20 tons
maximum level-flight speed (at 7,000 m)	650 km/hr
economy cruising speed (at 8,000 m)	516 km/hr
sea-level climb rate (take-off weight 51 tons)	10 m/sec
maximum range (take-off weight 61 tons)	5,463 km
maximum continuous flight time	10 hr 50 min
service ceiling	10,200 m
runway length for take-off	1,270 m
runway length for landing	1,050 m

The fuselage of the Y-8 is an all-metal semi-rigid shell structure, and is divided into four sections. The front section has two compartments: the forward compartment is the cockpit, which contains seats for the pilot, copilot, navigator, radio operator, and engineer; the rear compartment is a cabin which can accommodate 14 cargo handlers. The all-glass cockpit cover has an elliptical cross-section which is connected to the front section; next to the navigator's seat is a seat for a student trainee. The entire front section has a streamlined shape with very small profile drag; it is also completely sealed. The mid-section is a cargo bay, below which are the auxiliary fuel tanks. Overhead in the cargo bay is a 2.3-ton crane which can be used for loading and unloading. The total volume of the cargo bay is 123.3 m<sup>3</sup>. The forward part of the rear section is the cargo door, and the back part is connected to the tail section. The tail section is a sealed compartment which contains a seat for the tail gunner. In designing the longitudinal and lateral joints of the fuselage, considerations were given to the fabrication of the wallboards and the assembly procedure.



Cargo Bay of the 'Y-8' Transport

The wing design is an upper single wing of the trapezoidal, open-arm type. The wing area is 121.86 m<sup>2</sup>. The mean aerodynamic chord is 3,451 mm; the aspect ratio is 11.85; and the maximum lift-to-drag ratio is 15.3. The wing section is a low-drag laminar-flow airfoil, which has good lift characteristics under low drag conditions; it provides good stability and controllability at large angle of attack. The wing has an assembly angle of 4°; the mid-wing section has a dihedral of 1°, and the outer wing section has an inverted dihedral of 3°, so that the aircraft maintains stable flight in turbulent air. Lift augmentation devices consist of double-split trailing edge flaps and differential ailerons. Between the front and rear spars of the mid-wing sections and the central wing section are 26 soft fuel tanks with 1.5-mm thick walls; the outer wing section contains an integral fuel tank.

The tail section is a conventional trapezoidal tail whose control surfaces are manually operated, but it is equipped with a large axial compensation and adjustment blade, as well as a servo compensation blade.

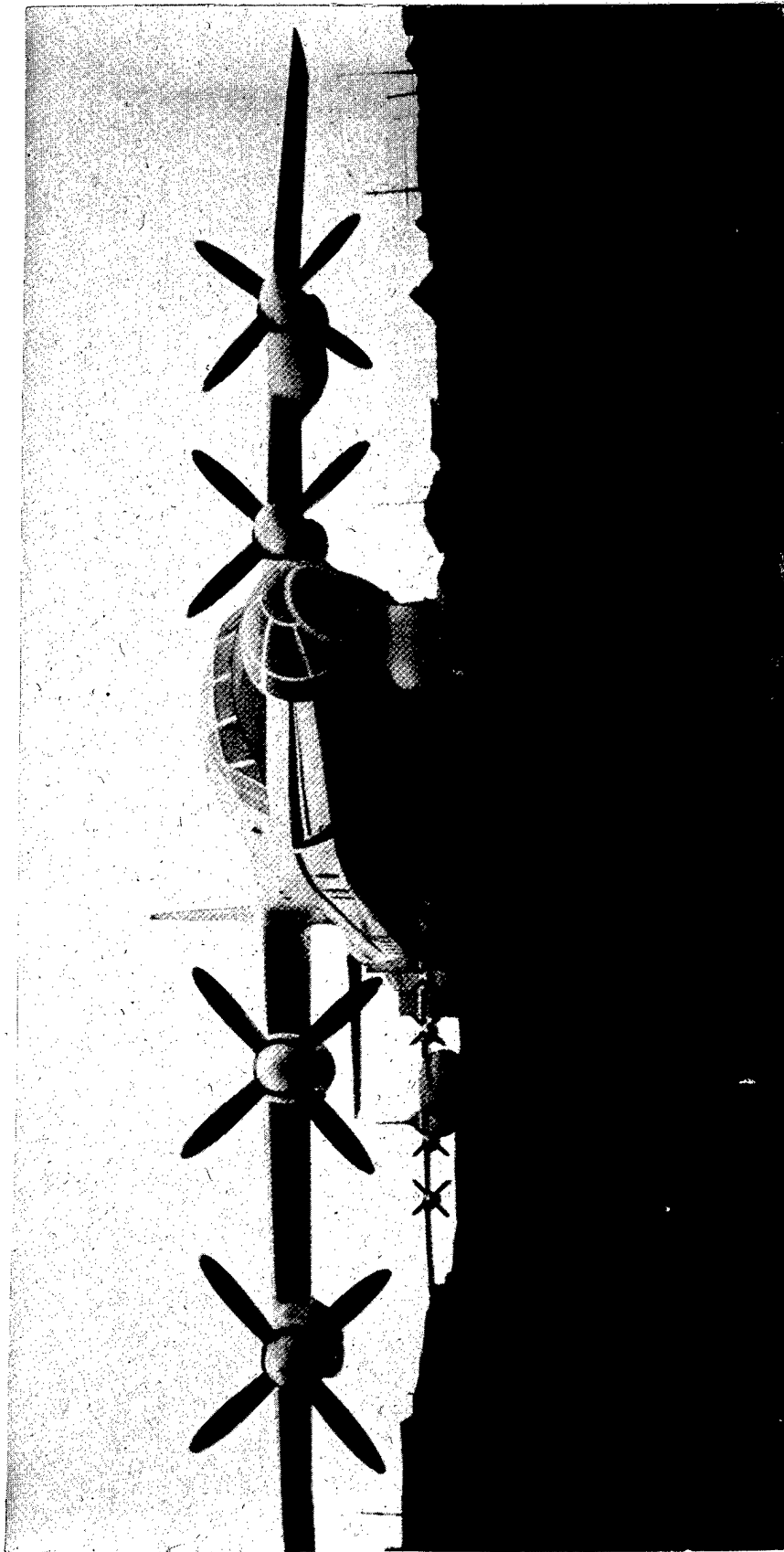
The landing gear is of the retractable tricycle type; the main landing gear is a four-wheel bogie which is retracted inward into the aircraft. The forward landing gear is of the two-wheel type which can be retracted rearward into the aircraft. The airplane has 10 wheels, all equipped with low-pressure tires.

The Y-8 can transport 20 tons of loose cargo or 16 tons of containerized cargo; it can carry 96 armed soldiers, or 58 paratroopers, or 60 seriously wounded (there are 60 stretches on the aircraft), 20 noncritically wounded, and 3 medical personnel. It can air-drop trucks, jeeps, recoilless rifles, 85mm cannons, rations, fuel (in barrels), and emergency supplies; the maximum weight for each air-drop item is 7,400 kg. Because of its large cargo bay and wide cargo door, the Y-8 can accommodate large-volume cargo (such as machinery, trucks, and containers) which cannot be transported by aircraft with side cargo doors.

The air-drop system of the Y-8 consists of rollers and guide rails; it can handle 12 1m boxes, or three 4m boxes, or two 6m boxes. The roller system has several advantages: low structure, light weight, and smooth operation; its reliability has been verified after 100 air-drop tests.

The Y-8 is equipped with flight instruments to allow safe operation under all weather conditions and during darkness. It has both d.c. and a.c. power supplies. The 28.5-volt d.c. power is provided by 8 d.c. generators and 4 batteries (emergency power supply). The 36-volt three-phase a.c. power is provided by two alternators. Its electronic equipment include: short-wave, single side-band radio, ultra-short wave radio, navigation radar, doppler radar, radio compass, and radio altimeter.

The control system consists of two parts: main control and auxiliary control. The hydraulic system consists of two independent subsystems, one on each side. The navigation instruments include a directional attitude system, automatic navigator, and automatic pilot. The aircraft is also equipped with an air-conditioning system, ice-prevention devices, fire extinguishers, life-saving equipment, and photographic equipment.



The Chinese-produced 'Y-8' Transport

During its development process, the Y-8 was subjected to wind-tunnel tests, static strength tests of the major components, total destruction test, landing gear shock tests, fuel system tests, windshield bird impact test, air-drop and roller system test, navigation system ground and flight tests, oxygen system ground and flight tests, as well as ground and flight tests of major finished products. Flight tests of the Y-8 were also performed in subtropical regions and low temperature regions. The test results indicate that the Y-8 satisfies all design requirements.

The Y-8 has good potential for further development; it can be modified into an early-warning aircraft, antisubmarine aircraft, midair refueling aircraft, pilotless aircraft, coastal patrol aircraft, air surveillance aircraft, weather aircraft, forest fire-fighting aircraft, or resource exploration aircraft.

Practical experience in using the Y-8 shows that it is an aircraft with a promising future which suits China's particular needs. It is expected to have a positive impact on China's air transportation as well as the four modernizations program.

3012

CSO: 4008/46

## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### 、 TITLES AWARDED TO SCIENTIFIC, TECHNICAL PERSONNEL

HK111450 Kunming Yunnan Provincial Service in Mandarin 2300 GMT 10 Feb 83

[Excerpts] The provincial people's government held a meeting to award titles of senior engineering and agrotechnic, and a tea party for some experts and scholars to mark the spring festival on 9 February at the hall of the Yuanchun Hotel. The provincial evaluation committee of the four senior technical titles of engineering, agriculture, public health and education; members of the provincial level evaluation committee of the eight professional technical titles of social sciences of the provincial level; experts, scholars, senior engineers and [words indistinct] responsible comrades of concerned departments, totalling over 400 people, attended the meeting.

The leaders concerned of the provincial CPC Committee, the Standing Committee of the provincial people's congress, the provincial government and the provincial CPPCC An Pingshen, Liu Minghui, Gao Zhiguo, [words indistinct] Yan Yiquan, Yang Kecheng, Ma Wengong, Wang Shichao and [words indistinct] were invited to the meeting and they awarded the certificates of titles printed by the relative departments of the State Council to 295 senior engineers, senior agronomists and agricultural [words indistinct].

Vice Governor Wang Shichao delivered a speech at the meeting.

Wang Shichao pointed out: The work to evaluate the technical titles of technical cadres has very important significance in further implementing the party's policy on intellectuals, strengthening the management of technical cadres, arousing the initiative of the broad masses of technical cadres in mastering their profession and building the four modernizations, promoting the development of the national economy and making the ranks of cadres more revolutionary, younger in average age, better educated and more professionally competent.

The vice governor reviewed the work of evaluating technical titles since 1980. He said: At present, the work of evaluating technical titles throughout the province is normally developing. Some 17,200 senior and medium-level scientific and technical personnel have been evaluated in the whole province, 7.56 percent of the total number of technical cadres of the whole province. The stage of evaluating the titles of medium-level and junior technical cadres

of natural science has already been completed. [Words indistinct] the evaluation of titles of technical cadres of social sciences is now in operation and it must be fundamentally completed within 1983-1984.

Finally, the governor encouraged the technical personnel of the whole province to stand in the forefront of the reform being carried out at present, be promoters of progress and contribute their wisdom so as to accelerate the pace of economic development of the province.

CSO: 4008/52



Electrical Automation

AUTHOR: LIU Yuanming [0491 0337 2494]

ORG: None

TITLE: "Conference for the Establishment of China Automation Society Electrical Automation Specialty Committee and Its First Annual Conference Held"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese No 1, 83 p 23

ABSTRACT: The conference to establish the China Automation Society Electrical Automation Specialty Committee and its first Annual Conference were held on 6-11 Oct 82 in Hangzhou. It was chaired by SHEN Anjun [3088 1344 0193], a deputy director of the committee. The Director of the committee, YANG Jingheng [2799 4544 5899] delivered the opening speech. The meeting was attended by 159 persons, coming from 93 units all over the country. A total of 105 papers were exchanged. Of these 24 were on DC transmission, 23 on AC transmission, 21 on computer applications, 13 on automatic control devices, 21 on control theory and its applications, and 3 on new trigger of silicon control devices. ZHANG Zhongjun [1728 6945 0193] YANG Jingheng, LI Huatian [2621 5478 1131] WANG Yan [2769 3508] HU Yaguang [5170 0068 0342] and LU Ji [4151 7535] were invited to report on trends of development in foreign countries, local network of microcomputers and office automation, observation of education of automation in Purdue University of USA, condition of education and research of automation in France, the BBC Company of Switzerland-frequency conversion speed regulation vector control, etc. The Specialty Committee resolved to call an Exchange Conference of DC transmission Technology in late 83. The deadline for submitting papers was set for the end of Jun 83.

AUTHOR: JIANG Zhongpeng [1728 0022 7720]

ORG: None

TITLE: "The 1982 Annual Conference of Automation Technology Applications Held in Qingdao"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese No 1, 83 p 49

ABSTRACT: On 14-20 Oct 82, a National Automation Technology Application Conference was called by the China Automation Society Application Committee and attended by 138 delegates representing 92 organizations all over the country. The condition of the 6th International Recognition Conference was introduced. A report on computer aided designing technology of control system was delivered by WU Zhiming [0702 2535 6900] and to 4 small separate groups, 92 papers on realms of petroleum, electric power, chemical engineering, metallurgy, machinery, textiles, light industry, socioeconomics, agriculture, ecology, military engineering, and basic theory application were delivered. This annual conference demonstrates the rapid extension of automation in China. Many young scientists delivered their papers for the first time, to form another sign of the promising development of automation. It was resolved that the next annual conference will be held in May 84.

6248

CSO: 4009/95

Electronics

AUTHOR: LIU Shiming [0491 0013 2494]  
ZHOU Jinwen [0719 6930 2429]  
WU Yiwen [2976 0310 2429]  
et al.

ORG: All of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "Optically Pumped CH<sub>3</sub>F and D<sub>2</sub>O FIR Pulse Laser"

SOURCE: Beijing DIANZIKEXUE XUEBAO [JOURNAL OF ELECTRONICS] in Chinese No 1,  
1983 pp 49-53

TEXT OF ENGLISH ABSTRACT: In this paper, the structure and the experimental results of a mirrorless FIR laser are described. A tunable TEA CO<sub>2</sub> laser is used as its pumping source. Its output energy is about 1J at both 9R(22) and 9P(20) lines. Output energy of 0.5 mJ at  $\lambda = 496 \mu\text{m}$  is obtained with CH<sub>3</sub>F molecular pumped by CO<sub>2</sub> laser 9P(20) line; 1 mJ at  $\lambda = 385 \mu\text{m}$  is obtained with D<sub>2</sub>O pumped by 9R(22) line. A thermopile and a Fanry-Perot interferometer are used to measure output energy and wavelength of FIR laser radiation respectively.

9717

CSO: 4009/94

## Engineering

AUTHOR: None

ORG: Dalian Institute of Technology

TITLE: "New High-resistance Material for Clinker Cooler Raise Plate"

SOURCE: Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY] in Chinese No 4, 1982 p 146

ABSTRACT: Clinker cooler raise plates in the Dalian Cement Plant have shown very poor resistance in high temperature abrasive environments. More than a year of research has yielded a new heat and abrasion resistant material which has not yet been used domestically or abroad. Compared with the  $\text{Cr}_{25}\text{Ni}_{20}$  generally used abroad, this new material does not include Ni and is therefore lower in cost, as Ni is scarce in China. Furthermore, this material has demonstrated superior heat and abrasion resistant qualities, particularly in  $900^{\circ}\text{C}$  high-temperature, high-abrasion environments. Experiments have shown that the life of this material should be five to six times that of the nodular cast iron presently being used, and 10 to 12 times that of gray iron. In addition, the cost will be 30 percent less, down time will be reduced, and energy savings realized.

AUTHOR: None

ORG: Dalian Institute of Technology

TITLE: "A Small High-accuracy Fluid Parameter Sensor Has Been Authenticated"

SOURCE: Dalian DALIAN GONGXUEYUAN XUEBAO [JOURNAL OF DALIAN INSTITUTE OF TECHNOLOGY] in Chinese No 4, 1982 p 186

TEXT OF ENGLISH ABSTRACT: The small high-accuracy fluid parameter sensor developed by us is of the small differential-pressure silicon integrated pressure sensor series. Such sensors have the advantages of small volume, light weight, high sensitivity, high stability and high reliability. Their main technical specifications have reached the standards of the same type of foreign products.

9717

CSO: 4009/84

Nonferrous Metallurgy

AUTHOR: TANG Moutang [0781 6180 1016]  
ZHAO Tiancong [6392 1131 1783]  
LE Songguang [2867 7313 0342]

ORG: All of Department of Nonferrous Metallurgy

TITLE: "Study of a New Metallurgical Process for Treating Jamesonite Concentrate of Dachang of Guangxi and Its Basic Theory"

SOURCE: Changsha ZHONGNAN KUANGYE XUEYUAN XUEBAO [JOURNAL OF CENTRAL-SOUTH INSTITUTE OF MINING AND METALLURGY] in Chinese No 4, Dec 82 pp 18-27

ABSTRACT: Aside from the 3 major elements of lead, antimony, and sulfur, the Jamesonite concentrate of Dachang also contains such valuables as silver, indium, bismuth, zinc, tin, arsenic, copper, etc. The fire refining process, presently in use, pollutes the environment severely and it is also difficult to separate the lead from the antimony. Such defects of wet metallurgy cannot be remedied by acid iron trichloride soaking alone. A new process of high density iron trichloride solution oxidation dry distillation is here presented, with discussions of the flow diagram, the equipment, and the experimental results. Comparisons with other techniques, proved the liquid-solid ratio to be smaller, the ratio of metal return to be higher, and filtration being not needed. The paper also reports studies on the gas-liquid phase-equilibrium problem and the dearsenization procedure by fractionation of high  $SbCl_3$  solution. The important equation of  $y_i = f_i'(t)/F'(t)$  was derived and the relationship between the temperature and balanced pressure of the volatile groups determined to provide important bases for designing the distillation equipment. This new process is also suitable for treating other complex or simple antimony ore concentrates.

AUTHOR: None

ORG: None

TITLE: "FANG Yi [2455 3015] Minister of State Scientific and Technological Commission Inspects the Institute"

SOURCE: Changsha ZHONGNAN KUANGYE XUEYUAN XUEBAO [JOURNAL OF CENTRAL-SOUTH INSTITUTE OF MINING AND METALLURGY] in Chinese No 4, Dec 82 p 10

ABSTRACT: FANG Yi, committee member of CPC Political Bureau and State Council and the Minister of Science and Technology was welcomed by the leaders of the Central-south Institute for an inspection tour on 8 Nov, just after attending the 2nd National Tungsten Conference held in this province. Accompanied by the provincial governor, the deputy governor, and the director of the provincial science committee, etc. he made a guided tour of the Research Institute of Powder Metallurgy, the newly constructed Tungsten-molybdenum Machine Shop and the Computer Station of the Department of Materials, etc. He listened to reports of those in charge of these divisions and voiced frequent inquiries and comments. While observing the new Tungsten-molybdenum Machine Shop, he also gave some important directives concerning the scientific research work there.

6248

CSO: 4009/96

Physics

AUTHOR: LI Yuanheng [2621 0337 1854]  
ZHANG Yufeng [1728 3768 1496]  
WU Shuxiang [0702 2579 4382]  
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ORG: LI of the Institute of Mechanics, Chinese Academy of Sciences; ZHANG, WU  
and DU all of Beijing University

TITLE: "Properties of Boron-diffused Si Irradiated by CW CO<sub>2</sub> Laser"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese  
No 4, 1982 pp 340-342

TEXT OF ENGLISH ABSTRACT: The dependence of sheet resistance on power density and scanning velocity of CW CO<sub>2</sub> laser irradiation on Si diffused at high temperatures with a high concentration of boron has been investigated. The experimental data show that the surface carrier concentration of B-diffused Si increases by 50 to 200 percent after CO<sub>2</sub> laser irradiation with a certain power density and scanning velocity.

9717

CSO: 4009/91

Space Science

AUTHOR: ZHAO Xuepu [6392 1331 3302]  
WILCOX, J.M.  
SCHERRER, P.H.

ORG: ZHAO of the Department of Geophysics, Beijing University; WILCOX and SCHERRER both of the Institute for Plasma Research, Stanford University

TITLE: "The Spiral Sector Transition Regions in the Interplanetary Magnetic Fields"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 1-9

TEXT OF ENGLISH ABSTRACT: Based on the large-scale configuration of the magnetic fields in the interplanetary space and the possible association of the solar wind flow near the sector boundary crossing with the coronal streamer, it is suggested that in the interplanetary space there might be some spiral sector transition regions which are thicker than the sector boundaries. In situ observations of interplanetary magnetic field and solar wind plasma do show the existence of the spiral sector transition regions. The magnetic strength in the regions does not go to zero for all the 45 cases studied in this work, with most of them having magnetic strength either much higher or much lower than the average of  $5 \gamma$  in the adjacent magnetic sectors. The physical properties in the magnetic depressing (MD) and magnetic enhancement (ME) regions and the possible causes have also been analyzed and discussed.

AUTHOR: ZHANG Heqi [1728 9735 4388]

ORG: Purple Mountain Observatory, Chinese Academy of Sciences

TITLE: "The Charged Particle Distribution and the Formation of Electric Field in Accretion Column of Neutron Star"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 10-15

TEXT OF ENGLISH ABSTRACT: In this paper we establish a set of kinetic equations from Liouville's theorem which can be used to describe the charged particle distribution in the accretion column of a neutron star. A brief description of the general behavior of the plasma on an accretion column of a neutron star having a very strong magnetic field with a weak inhomogeneity and with cylindrical symmetry is given. It is pointed out that the inhomogeneous magnetic field seems to have a major effect on the plasma and the charged particle distribution in the accretion column greatly depends both on the magnetic field structure and on the gravitational field of the neutron star. From the analysis we draw the following conclusions:

(1) The charged particle distribution in the accretion column with a very strong magnetic field is quite different from the one only controlled by the gravitational field of the neutron star, which is what most of the high energy astrophysicists

have determined. Sometimes one would expect that the charged particles can be pushed outward along the direction of the magnetic field and the matter density will increase with height.

(2) Due to the difference in mass between the electron and the proton, the distribution of protons with height is different from that of the electrons. Therefore, a strong electric field can take place near the surface of a neutron star. The type of electric field depends on the charged particle distribution.

(3) For very young neutron stars, the role of the magnetic field may exceed that of the gravitational field. In this case there will be no possibility of forming the accretion column and the pulse radiation therefore cannot be produced.

AUTHOR: LIU Zhenxing [0491 2182 5281]

ORG: Institute of Space Physics, Chinese Academy of Sciences

TITLE: "The Change Rate of Energy of the Test Electron Caused by Plasma Turbulence"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 16-22

TEXT OF ENGLISH ABSTRACT: The distribution function of the electron beam moving in the turbulent plasma is given for a definite diffusion coefficient. Using this distribution function and the kinetic equation, we have developed two formulas of change rate of the electron energy. One is the change rate of energy of the electrons with definite velocity  $d\epsilon/dt$ , and the other is the change rate of mean electron energy  $d\epsilon/dt$ . These formulas are more general than the previous formulas used in this field.

AUTHOR: XU Ronglan [1776 2837 2936]  
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ORG: Both of the Institute of Space Physics, Chinese Academy of Sciences

TITLE: "Scattering and Precipitating of Particles of the Magnetotail Under the Action of the Dawn-Dusk Electric Field"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 23-28

TEXT OF ENGLISH ABSTRACT: We think that scattering of particles of the magnetotail in forming precipitating particles is very important. In this paper, the pitch angle changing of charged particles of the magnetotail under the action of the dawn-dusk electric field is studied by evaluating about 900 trajectories by a computer. The results show clearly that the charged particles of the magnetotail under the action of the dawn-dusk electric field undergo an evident scattering process. The particles of the magnetotail which move through the nonperturbation region are reflected many times inside the nonperturbation region, the magnetic moment is no longer invariant, and when they leave the nonperturbation region their pitch angles are changeable. This change makes isotropic initial pitch angle distribution change into a Maxwellian state when the particles are away from the neutral line and enter into the region of near earth.

[Continuation of KONGJIAN KEXUE XUEBAO Vol 3 No 1, 1983 pp 23-28]

The space career of these particles is also studied, and it is found that they undergo space separation (dawn-dusk separation, latitude separation and a relative separation between the protons and electrons) when they leave the magnetotail and enter into near earth with the clear precipitating pattern of the particles.



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TITLE: "The Spacecraft Observations of the Position of Magnetopause"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in  
Chinese Vol 3 No 1, 1983 pp 29-35

TEXT OF ENGLISH ABSTRACT: The ellipsoid of the dayside magnetopause surface is calculated by 1024 magnetopause crossing data from 1963 to 1979. An attempt is made to search for the effects of the interplanetary magnetic field and solar wind thermal pressure on the position and shape of the dayside magnetopause. The uncertainties in the determination of the parameters of the ellipsoid from various sources are analyzed. Both numerical results and theoretical analyses show that the accuracy of the data available is not adequate enough to show the effects. Some suggestions are proposed for further work. Observations of the average values of the size, shape and orientation of the dayside magnetopause agree quite well with the theoretical prediction.

AUTHOR: TU Chuanyi [3205 0278 6095]

ORG: Department of Geophysics, Beijing University

TITLE: "The Relationship Between the Onset Times of the Negative Phase of Ionospheric Storms and the Main Phase of Magnetic Storms and a Theoretical Model"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in  
Chinese Vol 3 No 1, 1983 pp 36-43

TEXT OF ENGLISH ABSTRACT: In this paper, major negative phase ionospheric storms occurring from 1969 to 1973 at Manchouli (49.5°N, 117.5°E), Billerica (43°N, 71.5°W) and Freiburg (48°N, 07°E) are analyzed. It is found that if the associated magnetic storm main phase is around noon, the ionospheric storm negative phase begins in the afternoon at Billerica station and at Freiburg station, but the negative phase begins around midnight at Manchouli station. A theoretical model is presented to calculate the negative phase onset time. The model is based on two extended heat sources--one is on the day side of the auroral oval and the other on the night side. When the magnetic storm main phase begins, the molecule enriched air appears at the heat sources. The air is brought to the middle latitudes by the thermospheric winds and the electron loss rate there increases. This gives rise to the occurrence of the negative phase ionospheric storms. The onset times of the negative phase are calculated, and the results agree rather well with those of statistics.

AUTHOR: WANG Shen [3769 8746/2606]  
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Chinese Academy of Sciences

TITLE: "The Morphology and Occurrence of E<sub>s</sub>-s over Wuchang, China"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in  
Chinese Vol 3 No 1, 1983 pp 44-50

TEXT OF ENGLISH ABSTRACT: The occurrence and morphology of ionospheric E<sub>s</sub>-s over  
Wuchang, China, are examined and statistically analyzed.

The E<sub>s</sub>-s over this area possesses a high occurrence and clear trace. We consider  
E<sub>s</sub>-s to be neither an intrinsic companion of magnetic disturbances nor a phenomenon  
existing exclusively in the auroral zones and in the geomagnetic equatorial  
region.

Over this area, E<sub>s</sub>-s occurred mostly in magnetic quiet days, and the maximum of  
the occurrence rate is around 09h or 10<sup>h</sup>LMT diurnally and in summer months  
seasonally. No effect on this feature due to variations of the geomagnetic field  
or solar activity has so far been detected.

AUTHOR: LI Zhongyuan [2621 0022 0337]  
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TITLE: "Statistical Analysis of the Plasma Comets"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in  
Chinese Vol 3 No 1, 1983 pp 51-57

TEXT OF ENGLISH ABSTRACT: In this paper, a statistical analysis by which the  
comets are classified is presented. The relationship between the solar activity  
and the occurrence frequencies of the plasma comets is discussed. The analysis  
shows that the correlation of cometary events with the solar activity is weak,  
but obviously the cometary events correlate with the velocity of the solar wind.  
Finally, the aberration angle and its kinked effect are discussed. It is quite  
clear and definite that they both correlate with the solar wind.

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LU Chen [7120 2525]

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TITLE: "A Statistical Study of the Relationship Between Solar Flare and  
Geomagnetic Disturbance for 1966-1978"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in  
Chinese Vol 3 No 1, 1983 pp 58-66

TEXT OF ENGLISH ABSTRACT: This paper provides a set of curves for the variation  
of various geomagnetic indices,  $A_p$ ,  $AE$ ,  $Dst$  and  $K_p$ , initiated by solar flares  
grouped by their optical importance, duration and the distance from the central  
meridian.

It is shown that both the duration and optical importance are good criteria for  
the geomagnetically-effective flares. Statistically, only the major flares 3 or  
those of importance 2 with duration  $> 1.5$  hours can significantly disturb the  
geomagnetic field onto the levels of  $K_p \geq 4$ . For these major flares, brightness  
plays an important role in determining both the intensity and the character of  
the resulting disturbance. In general, the bright major flares affect the  $A_p$ ,  $AE$   
and  $Dst$  indices onto  $K_p \geq 4$ , while the normal or faint ones result in significant  
disturbance of the  $AE$  index limited to  $K_p = 4$  or 5 only.

[Continuation of KONGJIAN KEXUE XUEBAO Vol 3 No 1, 1983 pp 58-66]

It can be shown that there are two kinds of the east-west asymmetry in the  
distribution of the flare's position in response to the geomagnetic disturbance.  
Statistically, the disturbance in  $A_p$  and  $Dst$  indices intensified onto  $K_p \geq 6$  is  
related mainly to the flares situated between  $30^\circ E$  and  $60^\circ W$ , whereas the occurrence  
frequency of the disturbance with intermediate intensity of  $K_p = 4$  or 5 increases  
when the flare goes from the east to the west of the central meridian, peaking at  
 $60-90^\circ W$ . The disturbance of the  $AE$  index has both of the above asymmetries.

Also, there are some indications of the dependence of the intensity of geomagnetic  
disturbance upon the sun-earth propagation velocity of the flare ejecta, which  
may be sped up when the flare goes from the east to the west of the central  
meridian.

These results reflect the complex nature of the interplanetary disturbance  
produced by solar flares, which are under study and will be published elsewhere.

AUTHOR: LIU Tiejun [0491 6993 6511]

ORG: None

TITLE: "The Reflection and Transmission of Electromagnetic Waves from the Lossy Plasma Moving Parallel to the Interface"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 67-71

TEXT OF ENGLISH ABSTRACT: In this paper, by using the method of the relativistic theory, the expressions of the reflection and transmission coefficients of electromagnetic waves for a lossy plasma moving parallel to the interface are derived. It is shown that the reflected and transmitted fields are dependent on the velocity of the moving plasma if the collision is taken into account. If the collision is negligible, the result is identical with the one derived by C. YE. In the normal incident case, contrary to oblique incidence, the reflected and transmitted fields are independent of the velocity of the moving plasma.

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FAN Daxiong [5400 1129 7160]  
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ORG: All of Purple Mountain Observatory, Chinese Academy of Sciences

TITLE: "The Application of the Physical Parameter Method in the Solar X-ray Telescope--The Exact Measurement of the Coronal Plasma Parameters"

SOURCE: Beijing KONGJIAN KEXUE XUEBAO [CHINESE JOURNAL OF SPACE SCIENCE] in Chinese Vol 3 No 1, 1983 pp 72-77

TEXT OF ENGLISH ABSTRACT: The application of the physical parameter method in the solar X-ray telescope is discussed in this paper. The method is described principally, and the calculation results are given.

Analysis and calculations show that the energy densities of different structures in the solar corona can be measured quantitatively and directly by the method, and the results are more accurate than those determined by the filter ratio method.

9717

CSO: 4009/92

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